

CLAIMS

1. A battery pack comprising: a battery (1); a circuit substrate (5) having a charge/discharge safety circuit and
5 arranged on one end face (3) of the battery; and an end case (6) in which an external connection terminal (7) is set, wherein the circuit substrate (5) is arranged inside the end case (6), and the end case (6) is secured to the battery by screws (12) with a screw head (12a), the screw head (12a) extending
10 through and engaging with the end case (6) at both ends and tips of the screws (12) being engaged into the end face (3) at both ends of the battery (1).

2. The battery pack according to claim 1, wherein: the battery case (2) serves as an electrode terminal of one polarity
15 and an electrode terminal (4) of the other polarity is provided on the end face (3) in the battery (1); and one end (16a) of a safety protection device (16) is connected to the electrode terminal (4) in the end face (3) of the battery case (2) and the other end (16b) of the safety protection device (16) is connected
20 to the circuit substrate (5).

3. A battery pack comprising: a battery (1), a circuit substrate (5) having a charge/discharge safety circuit and arranged on one end face (3) of the battery; and an end case (6) in which an external connection terminal (7) is set, wherein
25 the circuit substrate (5) is arranged inside the end case

(6), and the end case (6) is secured to the battery (1) by coupling pins (22) with heads (22a), the heads (22a) of the coupling pins (22) extending through and engaging with the end case (6) at both ends and the tips of the coupling pins (22) being secured to the
5 end face (3) at both ends of the battery (1).

4. The battery pack according to claim 3, wherein the end face (3) of the battery (1) at least in a portion thereof to which the tip of the coupling pin is attached is provided with the same type of material as the coupling pin (22).

10 5. The battery pack according to claim 4, wherein the end face (3) of the battery (1) in a portion opposite the tip of the coupling pin is provided with the same type of material as the coupling pin (22).

6. The battery pack according to claim 3, wherein: the
15 battery case (2) serves as an electrode terminal of one polarity and an electrode terminal (4) of the other polarity is provided on the end face (3) in the battery (1); and one end (16a) of a safety protection device (16) is connected to the electrode terminal (4) in the end face (3) of the battery case (2) and the
20 other end (16b) of the safety protection device (16) is connected to the circuit substrate (5).

7. A battery pack comprising: a battery (1); a circuit substrate (5) having a charge/discharge safety circuit and arranged on one end face (3) of the battery; and an end case (6)
25 in which an external connection terminal (7) is set, wherein

the circuit substrate (5) is arranged inside the end case (6), and the end case (6) is secured to the battery by a coupling pin (42) with heads (42a), the heads (42a) extending through and engaging with the end case (6), such that the material forming the end face (3) of the battery bites into a recess (42c) formed in an outer periphery at the tip of the coupling pin (42) to secure the tip of the coupling pin (42) to the end face (3) of the battery.

8. The battery pack according to claim 7, wherein: the coupling pin (42) includes a protrusion (42b) at the tip that has the recess (42c) in its peripheral surface; the end face (3) of the battery includes a hole (3a) to which the protrusion (42b) at the tip of the coupling pin fits; and with the protrusion (42b) being fitted in the hole (3a), the tip of the coupling pin and the end face (3) of the battery are joined together by resistance welding.

9. The battery pack according to claim 7, wherein: the battery case (2) serves as an electrode terminal of one polarity and an electrode terminal (4) of the other polarity is provided on the end face (3) in the battery (1); and one end (16a) of a safety protection device (16) is connected to the electrode terminal (4) in the end face (3) of the battery case (2) and the other end (16b) of the safety protection device (16) is connected to the circuit substrate (5).

10. The battery pack according to any one of claims 1, 3, and 7, wherein: the battery case (2) serves as an electrode

terminal of one polarity and an electrode terminal (4) of the other polarity is provided on the end face (3) in the battery (1); a first connection bracket (13) having an upright portion (13a) is secured to the end face (3) of the battery case (2);
5 a connection plate (14) that makes surface contact with the upright portion (13a) of the first connection bracket (13) and that is partly connected to the circuit substrate (5) is arranged on the inner side of one side wall of the end case (6); and the upright portion (13a) and the connection plate (14) are welded
10 together through an aperture (6a) formed in one side wall of the end case (6) opposite the upright portion (14).

11. The battery pack according to any one of claims 2, 6, and 9, wherein: second and third connection brackets (17, 18) having upright portions (17a, 18a) that overlap each other are
15 secured to the other end (16b) of the safety protection device (16) and the circuit substrate (5), respectively; and the upright portions (17a, 18a) of the second and third connection brackets (17, 18) are welded together through an aperture (19) opened in the end case (6).

20 12. The battery pack according to any one of claims 1, 3, and 7, wherein the external connection terminal (7) set in the end case (6) is of the type that establishes or shuts connection between the battery and a device to be connected by a connector on the device side being inserted or removed.